ORIGINAL ARTICLES

THE DIAGNOSIS AND TREATMENT OF URETERAL CALCULUS.*

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The making of a diagnosis of ureteral disorders resembles in some respects the children's game of putting together the dismembered parts of a picture. Various combinations of the parts may be made that seem almost right, but still some feature of dress or figure is not filled in, or some extra part remains, and a little more study and a little more patience are needed before the correct assemblage has been obtained. So in our diagnostic problems various interpretations of symptoms and findings may be made that are in a measure satisfying but if we would be wholly correct in our conclusions much time, much patience and much readjusting may be necessary.

It has seemed to me that the real object of our meeting to-night—free discussion—could be best encouraged by the presentation of illustrative cases to which are appended a few remarks touching points of interest.

Case No. 1: Mr. R., age 24. On April 8th, 1908, he was suddenly attacked with very severe, non-radiating pain in the left loin which was only controlled after four or five hours by hypodermic injections of morphin. There was no dysuria, no pollakiuria, no hematuria. Since the onset there has been a constant, heavy, dull pain in the loin with acute exacerbations. Last night for the first time the pain was radiating in character, running down to the left testicle; this was not severe and lasted only a few minutes. The testicle was not retracted. Slight frequency of urination and a little pain with the act was also noted.

P. C.—Well nourished, medium build, lungs and heart normal. Palpation of abdomen shows left kidney tender, not palpable, tenderness extends along the course of the ureter to below the level of the umbilicus. Urine semi-transparent. Microscope shows few blood cells. No casts. Cystoscope reveals normal bladder mucosa, ureteral orifices normal, catheter into left ureter advanced about three inches but could not be passed beyond. Patient was returned to bed and kept under observation and treatment for a week. During this time the pain and tenderness were constant and there had been several attacks of ureteral colic.

April 21st: Cystoscope again used. Catheter carrying steel wire was introduced into ureter for two inches but could be advanced no further. Radiogram was taken with cystoscope and styleted catheter in place. When the plate was developed it showed a beautiful stone shadow in ureter with stylet leading up to it. The shadow showed the stone to be a small one and it seemed best to wait until nature could have time to effect its expulsion if possible; but after another week of suffering operation was decided upon. This was done on April 27th. Dr. Burroughs assisting. The extra-peritoneal route was followed and the stone was located at the bladder wall. It was removed with much difficulty through a small slit in the ureter. The ureter was sutured with catgut and the external wound closed except for a small cigarette drain which led down to the ureteral wound. Recovery was uneventful. There was practically no leakage from the ureteral wound.

The diagnosis of this case was perfectly simple and presented no difficulties, the last positive evidence being furnished by the X-ray and ureteral catheter. The removal of the stone presented considerable difficulty owing to its impacted condition in the ureteral mucous membrane and its location so low down in the ureter. In another operation in a similar case I think I should follow the technic of Gibbon and attempt to displace the stone upward by means of a finger introduced into the abdominal cavity through a small slit in the peritoneum. This operator and others testify to the great advantage of the peritoneal opening. The finger within the cavity can readily locate the stone and bring it up into the extraperitoneal wound where it can be more easily removed. By exercising a little care soiling of the peritoneal cavity is avoided. Probably a better procedure than any cutting operation would have been an attempt to dislodge the stone by the injection of liquid vaseline or oil into the ureter through a catheter.

Case No. 2: F. D., male, age 30. Gives history dating back ten years, of pain beginning in back and gradually approaching bladder. Hematuria began three years ago. No pollakiuria. Never passed gravel. At present pain is felt in bladder and radiates to glans penis.

P. C.—Abdominal palpation negative except for tenderness in left inguinal region. No tumor could be felt. Urine cloudy with pus and blood. Cystoscope shows bladder mucosa normal. Left ureteral orifice reddened and open. Catheter could be introduced but an inch. Right ureter normal and catheter readily entered. Urine from right ureter clear, normal. Urea 18. Urine from left ureter cloudy with pus and blood. Urea 7. X-ray shows shadow low down in left ureteral region.

Diagnosis: Ureteral calculus, impacted, in lower end of left ureter.

Operation: October 26th, 1907. Student assistants. Extraperitoneal route. Ureter freely exposed and stone located two and a half inches below pelvic brim. An incision was made in ureter two inches distal to the site of the stone and with a small scoop the calculus was brought up and extracted. Ureteral wound closed by catgut suture. Parietal wound closed except for small cigarette drain down to ureter. Recovery uninterrupted. After the operation the urine gradually cleared of pus and blood. Patient left the hospital in two weeks. To-day the patient is well and following his occupation, that of bootblack. He has had no return of urinary symptoms.

Except in the matter of frequency of urination this patient presented a rather typical picture of stone in the bladder and without the help of the cystoscope and X-ray a definite location of the

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trouble might have been difficult, but with these aids a very positive diagnosis was possible.

Case No. 4: W. H., male, age 53. Personal history negative except for rheumatic tendency which has been present for years. Three years ago had attack of pain in right lower abdomen which was diagnosed as appendicitis. He was in bed three or four days and in a few days more had regained his health. There was no operation. Six months ago had severe attack of pain in left kidney region which extended along ureter to bladder. The site of pain gradually traveled to bladder and after a rather hard paroxysm suddenly ceased. A month later a small calculus was expelled per urethram. Three or four days ago he had a rather severe attack of pain in right iliac region which subsided in a short time under hot applications. During the night of December twenty-third the present attack began. While asleep he was suddenly awakened by a severe pain in the region of the appendix which within a half minute had become agonizing and was attended with nausea and vomiting. Hot applications were applied and after a short time the pain subsided and the patient was fairly comfortable. During the following day more or less soreness remained. On the evening of the twenty-fourth, another paroxysm occurred and I was called. The patient was a man of large frame and big abdomen. Weight, 270 pounds. He was in the midst of a typical attack of acute colic which had its center in the appendicular region. In a short time the acute symptoms subsided. Examination showed a rather diffuse tenderness over the abdomen with the point of acuity a little below McBurney's point. There was no decided tension of the muscles over this region but on deep pressure much soreness was complained of. The tenderness gradually disappeared as the kidney region was approached and no soreness or tumor or muscular tension could be made out over the liver area. There was no unusual distension of the bowel. The pain was not radiating in character, there was no bladder disturbance. Temperature was normal. At first glance the case appeared to be clearly one of appendicitis but the more it was considered the less certain was I that all the conditions could be explained upon that hypothesis. The history of having passed a ureteral calculus a few months before, the extreme suddenness of onset of the present attack, and the absence of rise of temperature after twenty-four hours of suffering made me suspect that there might be some other causal factor to be considered. Favoring the theory of appendicitis was the history of a previous attack and the location and character of the pain. In order to be in a position to operate quickly, should occasion demand, the patient was sent at once to Lane Hospital. Here he was seen in consultation by Dr. Edwards of Salinas and Doctor Rixford. The acute symptoms had subsided but the distress and tenderness remained. After carefully going over the case the best that we could say was that it might be appendicitis or an inflammation of the cecum, or it might be ureteral colic due to stone. The possibility of gallbladder involvement was thought of but was ruled out for lack of tenderness in that region. A possible beginning hernia was also considered but was negatived.

In the meantime uranalysis showed the urine free from pus or albumen but a few blood cells could be found in nearly all of the specimens. Only once during the attack was the blood reported absent. Pictures were made of the kidney and ureteral region but owing to the extreme thickness of the abdomen and the further fact that the abdominal tenderness was so great that good compression could not be obtained, the plates were not altogether satisfactory. However, a rather suspicious shadow showed toward the lower end of the right ureter. The patient remained in the hospital a week. During this time there was never any rise in temperature, all the symptoms gradually subsided and he was quite comfortable except for the tenderness which was still present, although less marked, and an indefinite sense of discomfort in the inguinal region. Two or three times there had been a little irritation in the bladder. The bowel discharges contained occasional mucus and blood. The latter was accounted for by a slight hemorrhoidal tendency that had been present for some time. After returning home he had another attack of acute pain which terminated suddenly with a sense of great relief. This pain he described as similar in character to that experienced some months before when the calculus was passed. About this time Doctor Cooper saw him in consultation and advanced the theory of colitis as being at least a possible contributing factor. Rectal examination with the sigmoidoscope showed the bowel mucosa reddened and oedematous and considerable mucus present. Palpation over the colon also elicited tenderness, at this time as marked on the left as on the right side. The first X-ray pictures not having been wholly satisfactory, a second set were made with the shadow casting catheter in the left ureter. These plates were good and revealed no calculus in the urinary tract. Since that time the abdominal tenderness has subsided and the sense of distress in the inguinal region has not returned. No calculus has yet passed per urethram.

The diagnosis is still lacking in definiteness but probably should be "Ureteral calculus together with a mucous colitis."

From a study of this case it would seem that more attention should be given to the exclusion in our differential diagnosis of a mucous colitis unattended by fever or diarrhoea. It would seem possible that the accumulation of gas in a limited section of the big bowel, might be the chief factor in the production of many symptoms resembling ureteral or bladder colic.

Case No. 5: Mrs. H. B., age 52. Has been more or less a sufferer from mild articular rheumatism. No kidney or bladder trouble until July 12th, 1908, when suddenly a desire to urinate came on with post mictional pain, no blood. Onset of bladder symptoms was not preceded by back pains or radiating pains. The desire to urinate was very frequent and was felt day and night. She was com-

pelled to rest for six weeks. Lower abdomen became very sore. By November first the symptoms had abated and patient felt that health was restored. Two weeks later, after considerable exercise and some dietary excesses, the urinary distress returned. With this attack was noted radiating pains from lumbar region to bladder and the back was quite sore. She was examined by her physician who found the uterus and ovaries normal. There was no leucorrhoea. He pronounced the trouble due to the acid condition of her urine.

P. C.—Fairly well nourished. Palpation of abdomen negative. Urine clear, strong acid, no pus, no albumen, no blood. The pain felt during an attack is described as being located in the meatus externus. Cystoscope showed bladder mucosa normal except a small exfolding of the membrane on the floor of the bladder and a similar condition on the anterior wall. Ureters were normal. X-ray examination was declined at this time. The patient was advised that her trouble was probably due to a tendency to heavy, acid urine. She was placed upon a course of alkaline medication, together with liver stimulation. She improved for a few weeks but the symptoms recurred, when she consented to the X-ray examination. When the plates were developed a very suspicious shadow was seen in the lower right ureteral course. The patient left the city immediately after the examination and has not returned. In order to exclude the possibility of the shadow being that of a calcified gland or a phlebolith, a second picture will be made as soon as possible with the shadow casting catheter in the ureter. From the location of the shadow it would seem that a vaginal examination should enable the operator to successfully palpate the suspicious area.

Should further examination confirm the present tentative diagnosis of ureteral calculus the question of treatment must be considered. Very probably the stone could be removed by the vaginal route but this route offers some objections which cannot be wholly overcome, perhaps the chief of which is the greater frequency with which ureteral fistula seems to follow opening the tube from this direction. The extra-peritoneal route through the inguinal region may offer some difficulties owing to the location of the stone under the broad ligament. It has been stated that in these cases the combined intra and extra-peritoneal method is of great value. Before any cutting operation is advised repeated efforts should be made to dislodge the stone by means of the ureteral catheter, the injection of liquid vaseline, etc. If the calculus can be brought to the bladder wall it may be possible to remove it by dilating the ureteral orifice and applying forceps through the operating cystoscope.

Case No. 6: T. W., male. Family and personal history negative. On January twenty-seventh, 1909, had severe cramp in left groin which later extended along the ureter. No decided urinary disturbance, no radiating pains. The attack lasted about two hours, the patient not being confined to bed, and then subsided leaving a sense of soreness which was exaggerated by exercise. On January 29th, a second attack came on which was similar in character, although not so severe, as the first but presented the added symptoms of bladder irritation and retraction of the right testicle. Duration of attack one hour and a half. There was a repetition of the symptoms on January 30th. This attack was short but more severe than the others. Consulted a near-by physician, he happened to be in the interior of the State at the time, and a diagnosis of ureteral stone was made. He came to my office February third. Abdominal palpation was negative except slight pain on deep palpitation over right kidney. The urine was cloudy with pus and phosphates. The microscope showed blood. On February sixth catheter was introduced into the kidney pelvis and a radiogram was taken. The plate when developed showed the catheter reaching to the kidney, and at the line of the fourth lumbar spine the shadow of a small calculus could be seen in contact with the catheter which had passed beyond it. The diagnosis was of course clear. He was put upon diuretics and rather large doses of glycerin. Since that date he has had one mild attack of colic during which the urine became cloudy with pus and blood. Within twenty-four hours that attack gradually subsided and the urine became perfectly clear but upon sedimentation blood corpuscles could be detected. He is still under observation. The plan of procedure as outlined is to keep watch of the urine to see that no damage is done to the kidneys; in the meantime nature is to be encouraged in effecting the expulsion of the stone. If this is not accomplished ureteral oiling will be tried, reserving a cutting operation as a last resort.*

Before concluding I wish to briefly note some points in diagnosis and treatment that are of importance.

First: The history should be carefully gone into. If because of recent advance in diagnostic technic neglect of history taking is encouraged the loss to ureteral diagnosis would be almost as great as the gain.

Second: Physical examination of the patient by the ordinary methods must be encouraged.

Third: The examination of the urine may give the key to the situation and will certainly afford much valuable information. For direct diagnostic purposes the finding of blood is of prime importance. Its continued absence after repeated microscopic search of samples taken at different times would go far toward excluding the presence of a stone.

The character of the epithelial cells and other debris should be noted. We are all familiar with the high claims that are made for the diagnostic value of the presence of certain cell types, but these claims have not as yet been fully substantiated, and while much importance may be attached to them we would probably all hesitate in making a positive diagnosis upon the microscopic findings alone. More independent work by a greater number of investigators is necessary before the last word can be said as to the value of this method.

*The calculus has since been passed. It is small, somewhat irregular in form and is probably of mixed composition.

Fourth: The cystoscope and ureteral catheter are of immense value as diagnostic agents and without them our final diagnosis may remain in doubt. It is only by their combined use, however, that decided advantage is gained for the cystoscope alone can rarely be of service except in those cases in which the calculus occupies the bladder portion of the ureter. The ureteral catheter may show the point of obstruction. Repeated attempts must be made to introduce it further for its onward progress may be hindered simply by a fold in the mucous membrane which with care can be straightened out or which will disappear at another examination. It must be remembered that the catheter may slip past a stone if the latter does not fully occlude the lumen of the tube. This was illustrated in Case No. 6. The use of the waxed catheter is well known. I have had no personal experience with it. The catheter phonendoscope of Cabot or Eaton may be of service. In several of my cases I have thought its employment would afford valuable information. The shadow casting catheter is of much value in conjunction with the X-ray. The use of the styleted catheter was more or less difficult for the stylet as a rule made the catheter too stiff for easy or safe employment. However, these objections do not obtain with the specially prepared catheter that has incorporated in its walls substances that render it impervious to the rays. This catheter can be very readily introduced and outlines perfectly the whole course of the ureter. By its use one can readily determine whether a given shadow is cast by a calculus within the ureter or is made by some substance, as a calcified gland, located near by. These extra shadows are not at all uncommon, especially in the female pelvis, and might easily mislead if not taken into account. In Case No. 5 what appears to be the shadow of a calculus in the ureter may upon examination with the catheter in place prove to be wholly without the tube. We can readily conceive that one of these shadows might be so placed as to correspond exactly with the location of the ureter. In such event it would be difficult to determine the fact before operation but by carefully examining the urine for evidences of irritation, i. e., blood, epithelial cells, by use of the waxed catheter and by the ureteral phonendoscope a differentiation is possible. Dr. Seelig has reported a very interesting case in which the shadow casting substance was in the appendix which in turn was adherent to the ureter. The symptoms in the case exactly resembled those of ureteral stone. Probably had the ureteral phonendoscope been used it would have set the diagnosis right.

Fifth: Of all our methods of diagnosis the one of most striking value is the X-ray. By its skillful use, and under circumstances not too unfavorable, nearly every stone can be located. Not only can it be located but its size and shape can be determined and much valuable information be afforded as to the line of treatment to be followed. In conjunction with the shadow casting catheter many points are made plain that heretofore could not but be obscure. So valuable is this combined method that we can almost assert that no diagnosis is complete without its employment. The more one sees of this class of work the more convinced he becomes that only men specially skilled in clinical radiography can obtain the best results.

Sixth: Three methods of treatment are open to us. 1st, we may adopt an expectant plan and by encouraging free diuresis, by the use of urinary antiseptics, by sedatives, by large doses of glycerin, etc., we may trust to the natural expulsive efforts of the ureter to carry the calculus onward into the bladder from which position it can be removed at our leisure should it remain lodged there. This waiting policy can be followed with the more assurance if the X-ray and ureteral catheter have together demonstrated that the ureter is patulous and the stone is not so large as to positively preclude the possibility of its passage.

2nd: Should the stone not descend an attempt may be made to encourage its passage by flushing the ureter through a catheter introduced for that purpose. Any bland, aseptic fluid may be used but perhaps some oily preparation would be the best.

3rd: These two methods failing we may resort to some operative procedure the nature of which will be determined by the location of the stone and the attending pathological conditions. If the stone is in the bladder portion of the ureter the intravesical route would be the one of choice. If the patient is a female and the stone is located in the lower ureter the vaginal route of approach may be selected. Some objections to this plan have been noted. For the large majority of ureteral calculi the extraperitoneal abdominal route will be the one of choice. It may be combined with the small intraperitoneal slit in some cases that present great difficulties in dislodging the stone through the extraperitoneal incision. The transperitoneal approach is not to be recommended.

Finally: One has but to refer to the literature of comparatively recent date to note how impossible it was to determine only a decade or so ago with any degree of accuracy, the presence or location of a stone in the ureter. To-day by making use of the methods that are well known as much certainty is afforded in this field of investigation as in any other in medicine and from former doubt we are now brought into a comforting conviction that is alike of value to the patient and the surgeon. That all cases can be easily diagnosed is certainly not true as was evidenced in Case No. 4 and the opportunity still remains for the employment of the most acute reasoning that we possess, but with our old and our newer methods wedded together into a useful service the doubtful cases are becoming fewer and fewer and the definite ones are assuming very large and growing proportions.